

Comparing effects of nutrients on algal biomass in streams in two regions with different disturbance regimes and with applications for developing nutrient criteria

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Abstract

Responses of stream algal biomass to nutrient enrichment were studied in two regions where differences in hydrologic variability cause great differences in herbivory. Around northwestern Kentucky (KY) hydrologic variability constrains invertebrate biomass and their effects on algae, but hydrologic stability in Michigan (MI) streams permits accrual of high herbivore densities and herbivory of benthic algae. Multiple indicators of algal biomass and nutrient availability were measured in 104 streams with repeated sampling at each site over a 2)month period. Many measures of algal biomass and nutrient availability were positively correlated in both regions, however the amount of variation explained varied with measures of biomass and nutrient concentration and with region. Indicators of diatom biomass were higher in KY than MI, but were not related to nutrient concentrations in either region. Chl a and % area of substratum covered by *Cladophora* were positively correlated to nutrient concentrations in both regions. *Cladophora* responded significantly more to nutrients in MI than KY. Total phosphorus (TP) and total nitrogen (TN) explained similar amounts of variation in algal biomass, and not significantly more variation in biomass than dissolved nutrient concentrations. Low N:P ratios in the benthic algae indicated N as well as P may be limiting their accrual. Most observed responses in benthic algal biomass occurred in nutrient concentrations between 10 and 30 lg TP l⁻¹ and between 400 and 1000 lg TN l⁻¹.

